Communication at an angle

Mattias Appelgren, Ellen Breitholtz*, Robin Cooper* and Simon Dobnik
Department of Philosophy, Linguistics and Theory of Science, University of Gothenburg
firstname.surname@*(ling.)gu.se

Abstract

Spatial language and reasoning is an important part of human cognition and language. A major challenge associated with spatial language is that each speaker has their own point of view, which can cause problems when we need to co-ordinate w r t descriptions of a shared space. Previous studies indicate that it might be harder or easier to adapt to the POV of interlocutors depending on various contextual factors. In this pilot study, we ask the question: is it easier to adopt certain points of view and harder with others? In particular, does the angle at which interlocutors sit matter? In this paper we propose an experiment to test the hypothesis that it does.

1 Introduction

When referring to things in space people will take on different points of view (POV) also known as spatial perspective or frames of reference (FoR). Dobnik et al. (2020) show that people will shift the POV which they refer to over the course of a dialogue. In their dialogues two participants see a scene from different opposite perspectives, i.e. they are facing each other. There is also a third person observing the scene from the side (named Katie). In the data we observe that the participants generally choose either their own or the other participant's perspective. However, in the instances when they use Katie's perspective they are more likely to add explicit mentions to her perspective even when they have already agreed to it in the common ground in previous turns. What might cause this increase in explicit reference?

The task which the participants tackle in Dobnik et al. (2020) is one where they must describe a scene of cups on a table (we will call it the cups task). It means that they have to describe the relative position of these cups. In cognitive science, two types of perspective taking tasks are recognised. In the first a person must imagine if an object

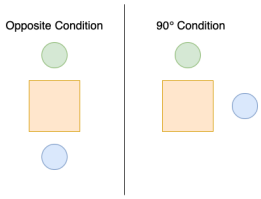

Figure 1: The two experiment conditions

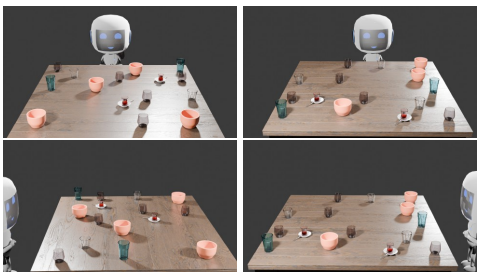

Figure 2: Above: the 180° perspective of experiment 1. Below: the 90° perspective.

is visible from another perspective, or is it occluded by an object in the line of vision. The second is to identify spatial relations from another POV (Flavell et al., 1986), e.g. identifying if an object is "left of" another object from another perspective. The second is harder and is seen as embodied, in the sense that it requires simulating the other perspective (Kessler and Rutherford, 2010). The cups task falls into the second category.

Our observations seem to indicate that taking on the perspective of Katie is more difficult than your own or that of someone standing opposite. The question would be why it would be more difficult. Kessler and Rutherford (2010) show that the angle between a person and the perspective they must adjust to impacts the amount of time they take to react to the spatial language understanding task they are given. This could explain why taking Katie's perspective is more difficult. However, in Kessler and Rutherford (2010) as the angle increases the reaction time increases, using the an-

Proceedings of the 29th Workshop on the Semantics and Pragmatics of Dialogue, September 3–5, 2025, Bielefeld, Germany.

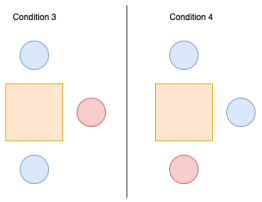

Figure 3: Experiment conditions including a third person who is not involved in the discussion.

gles 60°, 110° and 160°. This would go against the idea that Katie's perspective is more difficult since Katie stands at 90° and the other interlocutor stands at 180°. However, intuitively, it seems that it would be easier to do a 180° perspective shift, since it becomes the mirror perspective, where left is right. Cooper (2023) speaks about perspective taking as a re-labelling process, so in the 180° case the relabelling function is simple: left equals right and vice versa. At 90° it is harder, left becomes in front or behind, but once established should be consistent. While more odd shifts, like 60° or 160° do not have a straight forwards mapping, but rather require mental simulation.

Additionally, there may be an effect from the fact that the speakers are participating in a dialogue with each other. It may be easier simply to take on a perspective of someone you are actively speak with, rather than a third party observer.

These observations inform our hypotheses:

1. It is more difficult to take on a 90° perspective than a 180° perspective

2. taking on an interlocutor's perspective is easier than a 3rd person perspective

2 Experiment Design

In order to test our hypotheses we propose two experiments. Each experiment is based on the task in Dobnik et al. (2020) but with updated graphics and additional cases.

The task is one where two participants see a table with cups on it. Each participant has a different view of the scene. Additionally, some objects are only visible in one view but not the other. The images are computer generated and the objects are simply not rendered in one of the views (i.e. they are not occluded by objects in the scene). The other participant is represented with a little robot figure. The task is for the two participants to identify which objects they can see but not the other participant.

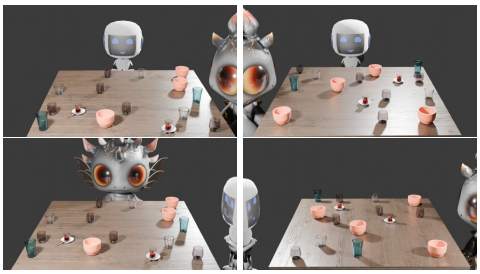

Figure 4: Above: the 180° perspective of experiment 2. Below: the 90° perspective.

The first experiment will test the first hypothesis. In it we set up two different conditions. In the first condition the two participants have opposite perspectives, while in the second condition they sit at a 90° angle, as shown from above in Figure 1. The computer rendered images we will show the participants are shown in Figure 2. We will measure task success, by the number of objects found within a limit of 20 minutes to see if participants are more successful in the 180° scenario. We will also analyse the dialogues for indications of greater difficulty completing the task, e.g. by more explicit references to the perspective used, more mistakes, or more clarification questions.

In the second experiment we will add a passive observer. The observer will either stand at a 90° angle, to the side of the participants who are facing each other, or will stand opposite one of the participants, as shown in Figure 4. The third person will be represented by a little dragon character. We will tell the participants to perform the task as in Experiment 1. However, with the additional instruction to use a particular perspective throughout. We will select between the different available perspectives. If our hypotheses hold, we would expect the task to be easiest when the participants are facing each other and using one of the participants perspective and hardest when facing each other and using the dragon's perspective. Seeing what perspective is hardest when one participant is facing the dragon will show whether there is a greater effect from using a 90° perspective or from using a perspective of a non-interlocutor.

References

Robin Cooper. 2023. *From perception to communication: a theory of types for action and meaning*. Oxford University Press.

Simon Dobnik, John D. Kelleher, and C. Howes. 2020.

Local alignment of frame of reference assignment in english and swedish dialogue. In *Spatial Cognition*.

John H Flavell, Frances L Green, Eleanor R Flavell, Malcolm W Watson, and Joseph C Campione. 1986. Development of knowledge about the appearance-reality distinction. *Monographs of the society for research in child development*, pages i–87.

Klaus Kessler and Hannah Rutherford. 2010. The two forms of visuo-spatial perspective taking are differently embodied and subserve different spatial prepositions. *Frontiers in psychology*, 1:213.